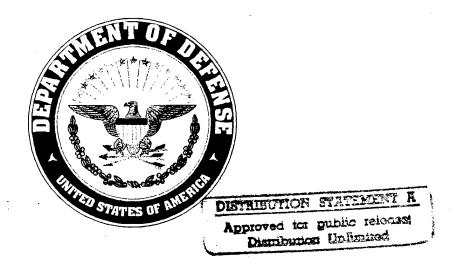
Demand Reduction Analysis for Aberdeen Proving Grounds

Aberdeen, Maryland



Final Submission

Performed by



Entech Engineering, Inc. Reading, Pennsylvania
June 1996

DEPARTMENT OF THE ARMY

CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS P.O. BOX 9005 CHAMPAIGN, ILLINOIS 61826-9005

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ABERDEEN PROVING GROUNDS DEMAND REDUCTION ANALYSIS

TABLE OF CONTENTS

<u>SEC</u> 1.0	<u>FION</u> EXE	TITLE CUTIVE SUMMARY 1-1 through 1-5
	1.1	Project Authorization and Objectives
	1.2	Synopsis of Findings
2.0	MET	THODOLOGY 2-1 through 2-18
	2.1	General 2-1
	2.2	Data Collection/Initial Review
	2.3	Site Inspection
	2.4	Model Existing Energy Consumption 2-3
		2.4.1 Feeder Selection
		2.4.2 Electric Rate Analysis
		2.4.3 Energy Values
	2.5	Energy Conservation Opportunities (ECOs)
	-	2.5.1 Existing Condition
		2.5.2 Proposed Condition Description
.*		2.5.3 Implementation Cost Estimates
		2.5.4 Energy Savings
		2.5.5 Maintenance Cost/Savings
		2.5.6 Discussion
		2.5.7 Life Cycle Cost Analysis Summary
	2.6	Opinions of Cost
		2.6.1 Direct Costs
		2.6.2 Indirect Costs
	2.7	Draft Report/Client Review/Final Report 2-17
3.0	FAC	TILITY DESCRIPTION 3-1 through 3-6
	3.1	General 3-1
	3.2	Existing Electrical System 3-1

TABLE OF CONTENTS (Continued)

SECT 3.0		TITLE (LITY DESCRIPTION
3.0	3.3	Operation Schedule
	3.4	Condition of Equipment 3-2
	3.5	Metering Results
4.0	BILL	LING HISTORIES 4-1 through 4-13
	4.1.	General 4-1
	4.2	Electricity
		4.2.1 Electric Submeter Readings 4-5
		4.2.2 Incremental Costs
		4.2.3 Electric Usage
		4.2.4 Monthly Demand 4-9
	4.3	Fuel Oil 4-10
	4.4.	Natural Gas
5.0	ELE	CTRIC DEMAND AND USAGE ANALYSIS 5-1 through 5-15
	5.1	General 5-1
.1	5.2	BG&E "Loadstar Billing Interface Data" 5-1
		5.2.1 Peak Day Trends
		5.2.2 Peak Time Trends
		5.2.3 Base Electric Load 5-6
		5.2.4 Electric Heating Load 5-6
		5.2.5 Electric Cooling Load 5-8
	5.3	Electric Model
	5.4	Substations with the Highest Demand 5-12
6.0	ENE	RGY CONSERVATION OPPORTUNITIES 6-1 through 6-75
	6.1	General 6-1
	6.2	ECOs 6-2
	6.3	ECOs Considered but Not Evaluated 6-74

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TABLE OF CONTENTS (Continued)

SEC	TION	TITLE		<u>PA</u>	<u>GE</u>
7.0	CON	ICLUSION	7-1	through	7-7
	7.1	General		• • • • • • •	7-1
	7.2	Recommended ECOs			7-4
	7.2	Non-Recommended ECOs			7-6

- Entech Engineering, Inc. -

ABERDEEN PROVING GROUNDS DEMAND REDUCTION ANALYSIS

LIST OF TABLES AND FIGURES

SEC'	TION TITLE PAGE
1.0	EXECUTIVE SUMMARY 1-1 through 1-5
	Table 1.2.1, Summary of ECOs, Prioritized by SIR
2.0	METHODOLOGY 2-1 through 2-18
	Table 2.4.3.1, mmBtu Units2-6Table 2.5.7.1, Recommended Economic Analysis Life2-12Table 2.5.7.2, LCCID Ready Reference2-14Table 2.5.7.3, Sample LCCID Report2-13
3.0	FACILITY DESCRIPTION 3-1 through 3-9
,	Figure 3.1.1, Base Map3-3Figure 3.2.1, Power Distribution of Post3-4Figure 3.2.2, Power Distribution3-5
4.0	BILLING HISTORIES 4-1 through 4-13
	Table 4.1.1, Energy Cost Distribution4-1Figure 4.1.2, Energy Cost Distribution4-1Table 4.2.1, P Rate Schedule4-2Table 4.2.2, Electric Billing History 1993-954-3Table 4.2.1.1, Electric Submeter Readings 1993-954-5Table 4.2.2.1, Incremental Costs4-7Figure 4.2.3.1, Electric Usage4-9Figure 4.2.4.1, Electric Demand4-10

LIST OF TABLES AND FIGURES (Continued)

SEC7 4.0	FION TITLE BILLING HISTORIES
	Table 4.4.1, Aberdeen Gas Usage
5.0	ENERGY CALCULATIONS 5-1 through 5-15
	Table 5.2.1.1, Peak Day Trends5-2Table 5.2.2.1, Peak Time Trends5-4Table 5.2.3.1, Base Electric Load Summary5-7Table 5.3.2, Electric Model Summary5-8Table 5.3.1, Electric Model5-9Figure 5.3.3, Annual Demand Distribution5-10Figure 5.3.4, Annual Usage Distribution5-11Figure 5.3.5, Annual Cost Distribution5-12Figure 5.4.1, 1995 Electric Demand5-13Figure 5.4.2, Percent Distribution5-14Table 5.4.3, Substations with the Highest Demand5-15
i	LIST OF TABLES AND FIGURES (Continued)
SEC ₁	TION TITLE PAGE
6.0	ENERGY CONSERVATION OPPORTUNITIES 6-1 through 6-75
7.0	CONCLUSION
	Table 7.1.1, ECO Summary7-2Table 7.2.1, Recommended ECO Summary7-5Table 7.3.1, Non-Recommended ECO Summary7-7

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1.0 EXECUTIVE SUMMARY

1.1 Project Authorization and Objectives

This project was authorized under the general provisions of Executive Order 12902 with specific implementation under the Army's Energy Engineering Analysis Program (EEAP). Entech Engineering, Inc. was commissioned under Contract DACA01-94-D-0037, Delivery Order 0010 issued by USAED, Mobile and Administered by USAED, Baltimore (Ted Gross). The objectives of the project are to research, identify, evaluate, and define energy saving projects that meet the Army's criteria and lead to energy savings at the Aberdeen Proving Grounds, Aberdeen campus, with respect to electrical demand reduction. Details of the authorization and objectives of this report, which delineates our contractual arrangement with the government, may be found in Section 8.11.

1.2 Synopsis of Findings

Entech Engineering, Inc. metered the Post at the substation level to provide some definition to the \$7,000,000 annual electric cost consumed by the 19,500 people who occupy over 1,700 buildings and 13 million square feet on Post. Overall, Entech considered means of reducing the demand portion of the electrical cost estimated at over \$2,900,000 per year.

A total of fourteen (14) Energy Conservation Opportunities (ECOs) were developed and evaluated. ECOs describe the means to reduce energy consumption and operating cost. Of the fourteen (14) ECOs, six (6) have been developed as economically feasible. The remaining eight (8) investigated did not prove to be economically attractive. Table 1.2.1 on the following page displays a summary of all ECOs investigated, prioritized by SIR.

Table 1.2.1, Summary of ECOs, Prioritized by SIR

ECO #	ECO Description	Construction Cost	Energy & Maint. Savings	Payback Period (yrs)	SIR
6	Peak Shaving with Emergency Generators	\$1,100	\$14,800	0.1	111.1
5	BG&E's Curtailment Service Rider	\$4,900,000	\$1,800,000	2.7	4.9
2	Upgrading Substation 4 & 9	\$520,000	\$140,000	3.7	3.6
3	Upgrading Substation 18	\$1,500,000	\$350,000	4.3	3.1
1A	New 115 kV Substation - 1 Transformer	\$2,700,000	\$585,000	4.6	2.9
1	New 115 kV Substation - 2 Transformers	\$4,100,000	\$585,000	7.0	1.9
8	Disable or Redirect Sensor for Doors	\$240	\$30	8.0	1.7
7	Electric Clothes Dryers to Natural Gas	\$79,000	\$10,100	7.8	1.3
12	Building 314 Ice Storage System	\$340,000	\$30,000	11.3	1.2
10	Electric Dryers to Gas - Includes New Dryers	\$177,000	\$10,100	17.5	0.6
13	Building 5046 Ice Storage System	\$343,000	\$13,000	26.4	0.1
11	Add Insulation to Freezer Wall	\$10,500	\$100	105.0	0.1
4	Emergency Generation Rider	\$0	\$11,700	0.0	0.0
9	Limit Use of Underfloor Warming System	\$0	\$1,800	0.0	0.0

In summary, a total of six (6) Energy Conservation Opportunities (ECO) have been recommended for implementation out of the fourteen (14) identified in this report. The ECOs were then categorized into one of five types of project. The five include:

- 1. Recommended ECIP
- 2. Recommended Non-ECIP General projects
- 3. Recommended Non-ECIP O&M projects
- 4. Recommended Non-ECIP LC/NC projects
- 5. Non-Feasible

Entech Engineering, Inc.

The criteria used to place the ECOs into these categories is detailed in Section 7.0. Of those, only two were considered to be eligible for ECIP designation, as shown in the table below

Table 1.2.2, Recommended ECIP Projects, Prioritized by SIR

ECO #	ECO Description	Construction Cost	Energy & Maint. Savings	Payback Period (yrs)	SIR
5	BG&E's Curtailment Service Rider	\$4,900,000	\$1,800,000	2.7	4.9
ı	New 115 kV Substation - 2 Transformers	\$4,100,000	\$585,000	7.0	1.9
	Totals	\$9,000,000	\$2,385,000	3.8	

The remaining four (4) ECOs that are recommended include one (1) Non-ECIP general projects and three (3) Non-ECIP low cost/no cost (LC/NC) projects.

All tables are shown in the following tables. There are no recommended Non-ECIP O&M projects.

Table 1.2.3, Recommended Non-ECIP General Projects, Prioritized by SIR

) ECO #	ECO Description	Construction Cost	Energy & Maint. Savings	Payback Period (yrs)	SIR
7	Electric Clothes Dryers to Natural Gas	\$79,000	\$10,100	7.8	1.3

Table 1.2.4, Recommended Non-ECIP O&M Projects, Prioritized by SIR

ECO#	ECO Description	Construction Cost	Energy & Maint. Savings	Payback Period (yrs)	SIR

Table 1.2.5, Recommended Non-ECIP LC/NC Projects, Prioritized by SIR

ECO#	ECO Description	Construction Cost	Energy & Maint. Savings	Payback Period (yrs)	SIR
6	Peak Shaving with Emergency Generators	\$1,100	\$14,800	0.1	111.1
8	Disable or Redirect Sensor for Doors	\$240	\$30	8.0	1.7
9	Limit Use of Underfloor Warming System	\$0	\$1,800	0.0	0.0
	Totals	\$1,340	\$16,630	0.1	

Depending on which ECOs are implemented, it is believed total energy cost savings realized could be over \$2.4 million per year. This will be a reduction of 34% of the total electric cost and a 24% reduction in total energy costs.

The non-recommended alternatives are listed below in Table 1.2.6. The eight (8) non-feasible ECOs have a payback period over 10 years or an SIR below 1.25.

Table 1.2.6, Non-Feasible Projects, Prioritized by SIR

ECO#	ECO Description	Construction Cost	Energy & Maint. Savings	Payback Period (yrs)	SIR
lA	New 115 kV Substation - 1 Transformer	\$2,700,000	\$585,000	4.6	2.9
2	Upgrading Substation 4 & 9	\$520,000	\$140,000	3.7	3.6
3	Upgrading Substation 18	\$1,500,000	\$350,000	4.3	3.1
4	Emergency Generation Rider	\$0	\$11,700	0.0	0.0
12	Building 314 Ice Storage System	\$340,000	\$30,000	11.3	1.2
10	Electric Dryers to Gas - Includes New Dryers	\$177,000	\$10,100	17.5	0.6
13	Building 5046 Ice Storage System	\$343,000	\$13,000	26.4	0.1
11	Add Insulation to Freezer Wall	\$10,500	\$100	105.0	0.1

The following sections of this report describe in detail the findings as outlined above and contain the necessary cost estimate and calculation backup data as required. The reader is encouraged to carefully review each of the following report sections to understand the assumptions, methodology, and discussions involved.

ATTACHMENT 8.9 LCCID DATA Entech Engineering, Inc.

nergy Conservation Investment Program (ECIP)

LCCID FY96

Installation & Location: Aberdeen Proving Grounds

Region data: MARYLAND Census Region: 3

roject NO. & Title: 4130.06 New 115 kV Substation - 2 Transformers iscal Year: 1995 Discrete Portion: ECO-1

Analysis Date: 04/12/96 Economic Life: 20 years

repared by: SAB

ECIP Summary Report

Investment

3560000 A. Construction Cost 270000 B. SIOH 270000 C. Design Cost \$4,100,000 D. Total Cost (1A+1B+1C)

E. Salvage Value of Existing Equip. \$0 F. Public Utility Company Rebate \$0

G. Total Investment (1D-1E-1F) \$4,100,000

. Energy Savings (+) / Costs (-) Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

========= Fuel		Price Units	V	Usage Units	Annual Savings	Discount Factor	Discounted Savings
======= Electricity	===== \$8.8	===== /Mbtus	-4,429	===== Mbtus	-\$38,926 \$640,000	E)	\$8,620,800
Elec. Deman	:		-4,429	Mbtus	\$601,074	1	\$8,082,058

. Non Energy Savings (+) / Costs (-)

9. NOII 11101 91		=					
Item	Savings/ Cost	Year	Discount Factor	Discounted Savings/Cost			
New ANNUAL TOTAL ONE TIME TOTAL TOTAL	-====== -\$15,000 -\$15,000 \$0 -\$15,000	Annual	13.47	-\$202,050 -\$202,050 \$0 -\$202,050			
=======================================							

. First Year Dollar Savings

5. Simple Payback Period (Years)

. Total Net Discounted Savings

. Savings to Investment Ratio If < 1, Project does not qualify

3. Adjusted Internal Rate of Return

\$586,074

7.0

\$7,880,008 1.92

7.56%

Life Cycle Cost Analysis

Study: nergy Conservation Investment Program (ECIP) LCCID FY96

Installation & Location: Aberdeen Proving Grounds

Region data: MARYLAND Census Region: 3

Project NO. & Title: 4130.06 New 115 kV Substation - 1 Transformers

iscal Year: 1995 Discrete Portion: ECO-1A

Analysis Date: 04/12/96 Economic Life: 20 years

arepared by: SAB

ECIP Summary Report

Investment

A. Construction Cost 2300000 B. SIOH 200000 200000 C. Design Cost D. Total Cost (1A+1B+1C) \$2,700,000

E. Salvage Value of Existing Equip. \$0 \$0

F. Public Utility Company Rebate G. Total Investment (1D-1E-1F) \$2,700,000

. Energy Savings (+) / Costs (-)

ate of NISTIR 85-3273-X used for Discount Factors Oct 1995

Fuel	Price	î l	Usage Savings	Usage Units	Annual Savings	Discount Factor	Discounted Savings
Electricity Elec. Deman TOTAL	,	/Mbtus	-4,429 -4,429		-\$38,926 \$640,000 \$601,074	13.47	-\$538,743 \$8,620,800 \$8,082,058

. Non Energy Savings (+) / Costs (-)

Item	Savings/	Year	Discount	Discounted
,	Cost		Factor	Savings/Cost
New ANNUAL TOTAL ONE TIME TOTAL TOTAL	-\$15,000 -\$15,000 \$0 -\$15,000		13.47	-\$202,050 -\$202,050 \$0 -\$202,050

. First Year Dollar Savings

5. Simple Payback Period (Years)

\$586,074 4.61

. Total Net Discounted Savings

\$7,880,008

. Savings to Investment Ratio

2.92

If < 1, Project does not qualify

8. Adjusted Internal Rate of Return

9.83%

nergy Conservation Investment Program (ECIP)

Installation & Location: Aberdeen Proving Grounds

Region data: MARYLAND Census Region: 3 roject NO. & Title: 4130.06 Upgrading Substations 4 & 9

iscal Year: 1995 Discrete Portion: ECO-2

Analysis Date: 04/12/96 Economic Life: 20 years

Prepared by: SAB

ECIP Summary Report

Inv	restment	450000
70	Construction Cost	450000
		35000
В.	SIOH -	• • • • •
۵.	Design Cost	35000
C.	Design cose	\$520,000
n	Total Cost (1A+1B+1C)	•
٠.	Salvage Value of Existing Equip.	\$0
T.	Galvade varue or myrperra	4

F. Public Utility Company Rebate \$0

G. Total Investment (1D-1E-1F) \$520,000

. Energy Savings (+) / Costs (-) ate of NISTIR 85-3273-X used for Discount Factors Oct 1995

			======	======			· ·
========= Fuel	====== Price 	Price Units	Usage Savings	Usage Units	Annual Savings	Discount Factor	Discounted Savings
======== Electricity Elec. Deman		===== /Mbtus		===== Mbtus Mbtus	\$0 \$140,000 \$140,000	1	\$0 \$1,885,800 \$1,885,800

Non Energy Savings (+) / Costs (-)

				=======		_
_	======================================	Savings/ Cost	Year	Discount Factor	Discounted Savings/Cost	
	ANNUAL TOTAL ONE TIME TOTAL TOTAL	\$0 \$0 \$0 \$0	=====		\$0 \$0 \$0 \$0	
=	=======================================	========	======	========	=========== \$140 000	=

. First Year Dollar Savings

. Simple Payback Period (Years)

6. Total Net Discounted Savings

2. Savings to Investment Ratio

If < 1, Project does not qualify

o. Adjusted Internal Rate of Return

\$140,000

3.71

\$1,885,800

3.63

LCCID FY96

11.03%

nergy Conservation Investment Program (ECIP) Installation & Location: Aberdeen Proving Grounds

Region data: MARYLAND Census Region: 3

roject NO. & Title: 4130.06 Upgrading Substations 18

iscal Year: 1995 Discrete Portion: ECO-3

Analysis Date: 04/12/96 Economic Life: 20 years

repared by: SAB

ECIP Summary Report

Investment

A. Construction Cost 1300000

B. SIOH 100000

C. Design Cost 100000

D. Total Cost (1A+1B+1C) \$1,500,000

D. Total Cost (1A+1B+1C) \$1, E. Salvage Value of Existing Equip. \$0

E. Salvage Value of Existing Equip. 50 F. Public Utility Company Rebate \$0

G. Total Investment (1D-1E-1F) \$1,500,000

. Energy Savings (+) / Costs (-) Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

Fuel	Price	Price Units	 Usage Units	Annual Savings	Discount Factor	Discounted Savings
======= Electricity Elec. Deman TOTAL		/Mbtus	Mbtus Mbtus	\$0 \$350,000 \$350,000	13.47	\$0 \$4,714,500 \$4,714,500

. Non Energy Savings (+) / Costs (-)

					=
Item	Savings/ Cost	Year	Discount Factor	Discounted Savings/Cost	
ANNUAL TOTAL ONE TIME TOTAL TOTAL	\$0 \$0 \$0	======		\$0 \$0 \$0	

. First Year Dollar Savings

. Simple Payback Period (Years)

6. Total Net Discounted Savings

7. Savings to Investment Ratio

If < 1, Project does not qualify

8. Adjusted Internal Rate of Return

\$350,000

4.29

\$4,714,500

3.14

LCCID FY96

10.23%

nergy Conservation Investment Program (ECIP)

Installation & Location: Aberdeen Proving Grounds Region data: MARYLAND Census Region: 3

roject NO. & Title: 4130.06 Emergency Generation Rider

roject NO. & Title: 4130.00 Emergency continues and year: 1995 Discrete Portion: ECO-4

Analysis Date: 04/12/96 Economic Life: 20 years

repared by: SAB

ECIP Summary Report

Investment		_
A. Construction Cost		0
B. SIOH	•	0
C. Design Cost		0
n Total Cost (1A+1B+1C)		\$0
E Salvage Value of Existing Equip.	•	\$0
F. Public Utility Company Rebate		\$0
C Total Investment (1D-1E-1F)		\$0

***** No investment costs. Other items should be checked. *****

2. Energy Savings (+) / Costs (-)

Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

-				======	========		
Fuel	Price	Price Units	Usage Savings	Usage Units	Annual Savings	Discount Factor	Discounted Savings
Electricity Elec. Deman Residual Oi Natural Gas TOTAL	\$5.1	/Mbtus /Mbtus /Mbtus	-178 -300	Mbtus Mbtus Mbtus Mbtus Mbtus	\$1,676 \$1,676 \$16,700 -\$899 -\$1,530 \$15,947	17.62 17.89	\$23,193 \$224,949 -\$15,839 -\$27,372 \$204,932

. Non Energy Savings (+) / Costs (-)

·		====	=========		:
 L Item	Savings/ Cost	Year	Discount Factor	Discounted Savings/Cost	
======================================	-\$4,300 -\$4,300 \$0 -\$4,300		13.47		
	:=======	======	=======		-

. First Year Dollar Savings

5. Simple Payback Period (Years)

. Total Net Discounted Savings

. Savings to Investment Ratio

If < 1, Project does not qualify

8. Adjusted Internal Rate of Return

\$11,647

LCCID FY96

\$147,011

NA

-100.0%

nergy Conservation Investment Program (ECIP) Installation & Location: Aberdeen Proving Grounds

Region data: MARYLAND Census Region: 3

roject NO. & Title: 4130.06 Curtailment Service Rider

iscal Year: 1995 Discrete Portion: ECO-5

Analysis Date: 04/12/96 Economic Life: 20 years

repared by: SAB

ECIP Summary Report

Investment

4300000 A. Construction Cost 300000 B. SIOH 300000 C. Design Cost \$4,900,000 D. Total Cost (1A+1B+1C)

E. Salvage Value of Existing Equip. F. Public Utility Company Rebate \$0

G. Total Investment (1D-1E-1F) \$4,900,000

Energy Savings (+) / Costs (-) Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

5					=========	====	
========= Fuel		Price Units	Usage Savings	Usage Units	Annual Savings	Discount Factor	Discounted Savings
Electricity Elec. Deman Residual Oi TOTAL	\$14.9	===== /Mbtus /Mbtus	2,048	===== Mbtus Mbtus	\$30,597 \$1,800,000 -\$34,461 \$1,796,136	13.47 17.62	\$24,246,000

3. Non Energy Savings (+) / Costs (-)

		=========	============
Savings/ Cost	Year	Discount Factor	Discounted Savings/Cost
=======	======	=======	=========
40			\$0
50			\$0
7 7			sol sol
ļ \$0	İ		
		Cost ====================================	Cost

1. First Year Dollar Savings

5. Simple Payback Period (Years)

6. Total Net Discounted Savings

7. Savings to Investment Ratio

If < 1, Project does not qualify</pre> 8. Adjusted Internal Rate of Return \$1,796,136

2.73

LCCID FY96

\$24,062,260

4.91

12.72%

Study:

LCCID FY96

Life Cycle Cost Analysis nergy Conservation Investment Program (ECIP)

installation & Location: Aberdeen Proving Grounds

Region data: MARYLAND Census Region: 3

roject NO. & Title: 4130.06 Peak Shaving with Emergency Generators

iscal Year: 1995 Discrete Portion: ECO-6

Analysis Date: 04/12/96 Economic Life: 20 years

repared by: SAB

ECIP Summary Report

Investment

TIIVCDOMOTTO		1100
A. Construction Cost		2200
B. SIOH		U
D. Dion.		66
C. Design Cost		ė1 166
n Total Cost (1A+1B+1C)		\$1,166
E. Salvage Value of Existing Equip		\$0
E. Salvage value of Exiberny 240-P	-	ġ0
F. Public Utility Company Rebate		т -
G Total Investment (1D-1E-1F)		\$1,166
G LOEST THACSCHICTLE (#P TF T-)		

. Energy Savings (+) / Costs (-) Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

Ju 5 -						=======	========
========= Fuel	Price	Price Units	Usage Savings	Usage Units	Annual Savings	Discount Factor	Discounted Savings
======= Electricity Elec. Deman Residual Oi Natural Gas TOTAL	\$5.1		-1,302 -2,202 -2,453	Mbtus Mbtus	\$15,702 \$17,000 -\$6,575 -\$11,230 \$14,897	17.62 17.89	

👪. Non Energy Savings (+) / Costs (-)

Item	Savings/ Cost	Year	Discount Factor	Discounted Savings/Cost				
	=======	======	=======	=========				
ANNUAL TOTAL	\$0			\$0 \$0				
ONE TIME TOTAL	\$0			\$0 \$0				
TOTAL	\$0			ŞU				
	========	=======	=======	========				
	_			Ċ1/ 007				

\$14,897 4. First Year Dollar Savings

.08 5. Simple Payback Period (Years) . Total Net Discounted Savings \$129,543

111.1 7. Savings to Investment Ratio

If < 1, Project does not qualify 31.75% Adjusted Internal Rate of Return

Study: Life Cycle Cost Analysis

nergy Conservation Investment Program (ECIP)

Installation & Location: Aberdeen Proving Grounds

Region data: MARYLAND Census Region: 3

Project NO. & Title: 4130.06 Electric Clothes Dryers to Natural Gas

Fiscal Year: 1995 Discrete Portion: ECO-7

Analysis Date: 04/12/96 Economic Life: 20 years

Prepared by: SAB

ECIP Summary Report

Investment

Investment	68000
A. Construction Cost	6000
B. SIOH	5000
c Design Cost	
p $r_0 + 3$ l $cost (1A+1B+1C)$	\$79,000
E. Salvage Value of Existing Equip.	\$0
E. Salvage value of many Rehate	\$0
F. Public Utility Company Rebate	\$79,000
G. Total Investment (1D-1E-1F)	4.57000

2. Energy Savings (+) / Costs (-) Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

Date Or Naba.				=======			
======== Fuel	====== Price	====== Price Units	Usage Savings	Usage Units	Annual Savings	Discount Factor	Discounted Savings
======== Electricity	===== \$9.8	===== /Mbtus	======	===== Mbtus	\$12,291 \$7,000		\$170,103
Elec. Deman Natural Gas		/Mbtus	-1,799 -541	Mbtus Mbtus	-\$9,175 \$10,116	17.89	-\$164,139 \$100,254
TOTAL	!	1	:		========	=======	========

3. Non Energy Savings (+) / Costs (-)

J. NO11 =====J1		=		:======
======================================	Savings/ Cost	Year	Discount Factor	Discounted Savings/Cost
======================================	======= \$0 \$0 \$0	=====	=======	\$0 \$0 \$0 \$0
=======================================	\$10,116			

4. First Year Dollar Savings

5. Simple Payback Period (Years)

6. Total Net Discounted Savings

7. Savings to Investment Ratio

If < 1, Project does not qualify

8. Adjusted Internal Rate of Return

\$10,116

7.81

LCCID FY96

\$100,254

1.27

5.35%

nergy Conservation Investment Program (ECIP)

Installation & Location: Aberdeen Proving Grounds

Region data: MARYLAND Census Region:

roject NO. & Title: 4130.06 Disable Door Sensor

iscal Year: 1995 Discrete Portion: ECO-8

Analysis Date: 04/12/96 Economic Life: 20 years

repared by: SAB

ECIP Summary Report

LCCID FY96

Investment

A. Construction Cost 240 0

B. SIOH

C. Design Cost

D. Total Cost (1A+1B+1C) \$240

E. Salvage Value of Existing Equip. \$0

F. Public Utility Company Rebate \$0

G. Total Investment (1D-1E-1F) \$240

Energy Savings (+) / Costs (-) Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

Fuel	Price		Usage Savings	Usage Units	Annual Savings	Discount Factor	Discounted Savings
======= Electricity Elec. Deman	1 '	===== /Mbtus		Mbtus Mbtus	\$20 \$10 \$30	13.47	\$270 \$135 \$405

. Non Energy Savings (+) / Costs (-)

Item	Savings/ Cost	Year	Discount Factor	Discounted Savings/Cost
ANNUAL TOTAL ONE TIME TOTAL TOTAL	\$0 \$0 \$0 \$0	=====	======	\$0 \$0 \$0 \$0

\$30 . First Year Dollar Savings 8.12 5. Simple Payback Period (Years) \$405 6. Total Net Discounted Savings

7. Savings to Investment Ratio 1.69

If < 1, Project does not qualify

6.86% 8. Adjusted Internal Rate of Return

nergy Conservation Investment Program (ECIP)

Installation & Location: Aberdeen Proving Grounds

Begion data: MARYLAND Census Region: 3

roject NO. & Title: 4130.06 Limit Floor Warming System

Fiscal Year: 1995 Discrete Portion: ECO-9

Analysis Date: 04/12/96 Economic Life: 20 years

repared by: SAB

ECIP Summary Report

LCCID FY96

	vestment	
Α.	Construction Cost	0
	SIOH	0
C.	Design Cost	0
D.	Total Cost (1A+1B+1C)	\$0
E.	Salvage Value of Existing Equip.	\$0
F.	Public Utility Company Rebate	\$0
	Total Investment (1D-1E-1F)	\$0

***** No investment costs. Other items should be checked. ****

2. Energy Savings (+) / Costs (-)

Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

			 		=======	:==========
Fuel	Price	Price Units	 Usage Units	Annual Savings	Discount Factor	Discounted Savings
Electricity Elec. Deman TOTAL		===== /Mbtus	 ===== Mbtus Mbtus	\$1,000 \$800 \$1,800	13.84 13.47	\$13,837 \$10,776 \$24,613

Non Energy Savings (+) / Costs (-)

· Item	Savings/ Cost	Year	Discount Factor	Discounted Savings/Cost				
	=======	======	=======	========	ĺ			
ANNUAL TOTAL	\$0			\$0	ı			
ONE TIME TOTAL	\$0			\$0	ĺ			
TOTAL	\$0			\$0	l			
	•							

4. First Year Dollar Savings \$1,800
5. Simple Payback Period (Years) 0
5. Total Net Discounted Savings \$24,613
7. Savings to Investment Ratio NA
If < 1, Project does not qualify
8. Adjusted Internal Rate of Return -100.0%

nergy Conservation Investment Program (ECIP) Installation & Location: Aberdeen Proving Grounds

Region data: MARYLAND Census Region: 3

roject NO. & Title: 4130.06 Electric Dryers to Gas - New Dryers

iscal Year: 1995 Discrete Portion: ECO-11

Analysis Date: 04/12/96 Economic Life: 20 years

repared by: SAB

ECIP Summary Report

Investment

154000 A. Construction Cost 12000 B. SIOH 11000 C. Design Cost D. Total Cost (1A+1B+1C) \$177,000

E. Salvage Value of Existing Equip. \$0

F. Public Utility Company Rebate

G. Total Investment (1D-1E-1F) \$177,000

. Energy Savings (+) / Costs (-)

Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

========= Fuel	 ====== Price Units	Usage Savings	Usage Units	Annual Savings	Discount Factor	Discounted Savings
Electricity Elec. Deman Natural Gas TOTAL	===== /Mbtus /Mbtus	-1,799		\$12,291 \$7,000 -\$9,175 \$10,116	13.47 17.89	\$170,103 \$94,290 -\$164,139 \$100,254

3. Non Energy Savings (+) / Costs (-)

	=	=======	======	
Item	Savings/ Cost	Year	Discount Factor	Discounted Savings/Cost
ANNUAL TOTAL ONE TIME TOTAL TOTAL	\$0 \$0 \$0 \$0	======	=======================================	\$0 \$0 \$0 \$0
L==============				

. First Year Dollar Savings

5. Simple Payback Period (Years)

6. Total Net Discounted Savings

. Savings to Investment Ratio

If < 1, Project does not qualify

8. Adjusted Internal Rate of Return

\$10,116

17.5

LCCID FY96

\$100,254

.57

1.18%

Life Cycle Cost Analysis

nergy Conservation Investment Program (ECIP)

stuay:

LCCID FY96

installation & Location: Aberdeen Proving Grounds Census Region:

Region data: MARYLAND roject NO. & Title: 4130.06 Insulation

iscal Year: 1995 Discrete Portion: ECO-12 Analysis Date: 04/12/96 Economic Life: 20 years

Prepared by: SAB

ECIP Summary Report

Investment

9100 A. Construction Cost 700 B. SIOH 700 C. Design Cost \$10,500 D. Total Cost (1A+1B+1C)

E. Salvage Value of Existing Equip. \$0

F. Public Utility Company Rebate

G. Total Investment (1D-1E-1F) \$10,500

2. Energy Savings (+) / Costs (-) Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

Date Of His						====	
======================================	====== Price	====== Price	usage	Usage	Annual Savings	Discount Factor	Discounted Savings
======= Electricity	1	Units ===== /Mbtus	=======	Units ===== Mbtus	\$40 \$60	13.84	\$808
Elec. Deman			6	Mbtus	\$100 =======	 ========	\$1,362 ========

B. Non Energy Savings (+) / Costs (-)

D. Non hitchell			========	=========	
	Savings/ Cost	Year ======		Discounted Savings/Cost	
ANNUAL TOTAL ONE TIME TOTAL TOTAL	\$0 \$0 \$0		========	\$0 \$0 \$0	

\$100 🏿 First Year Dollar Savings 104.98 5. Simple Payback Period (Years)

6. Total Net Discounted Savings

\$1,362 .13 7. Savings to Investment Ratio

If < 1, Project does not qualify -6.01%

8. Adjusted Internal Rate of Return

nergy Conservation Investment Program (ECIP) Installation & Location: Aberdeen Proving Grounds

Census Region: 3

Region data: MARYLAND roject NO. & Title: 4130.06 Ice Storage for Building 314

iscal Year: 1995 Discrete Portion: ECO-13

Analysis Date: 04/12/96 Economic Life: 20 years

Prepared by: SAB

ECIP Summary Report

Investment

296000 A. Construction Cost 22000 B. SIOH 22000 C. Design Cost \$340,000 D. Total Cost (1A+1B+1C)

E. Salvage Value of Existing Equip. \$0 F. Public Utility Company Rebate \$0

G. Total Investment (1D-1E-1F) \$340,000

. Energy Savings (+) / Costs (-)

Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

J 0. U -							
======== Fuel	====== Price	Price Units	Usage Savings	Usage Units	Annual Savings	Discount Factor	Discounted Savings
======= Electricity	ľ.	===== /Mbtus	-104	===== Mbtus	-\$1,700 \$31,700		-\$23,534 \$426,999
Elec. Deman TOTAL			-104	Mbtus	\$30,000		\$403,466 ========

. Non Energy Savings (+) / Costs (-)

-y. 10					
Item Item ANNUAL TOTAL ONE TIME TOTAL TOTAL	Savings/ Cost ======== \$0 \$0 \$0	Year	Discount Factor	Discounted Savings/Cost ====================================	
=======================================	======================================	-			

4. First Year Dollar Savings

5. Simple Payback Period (Years)

6. Total Net Discounted Savings

7. Savings to Investment Ratio If < 1, Project does not qualify

8. Adjusted Internal Rate of Return

\$30,000

11.33 \$403,465

1.19

LCCID FY96

4.99%

nergy Conservation Investment Program (ECIP)

LCCID FY96

installation & Location: Aberdeen Proving Grounds

Region data: MARYLAND Census Region: 3

Region data: MARIDAND Census Region.

Project NO. & Title: 4130.06 Ice Storage for Building 5046

iscal Year: 1995 Discrete Portion: ECO-14

Analysis Date: 04/12/96 Economic Life: 20 years

Prepared by: SAB

ECIP Summary Report

. Investment

A. Construction Cost

B. SIOH

C. Design Cost

D. Total Cost (1A+1B+1C)

E. Salvage Value of Existing Equip.

298000

23000

22000

\$343,000

E. Salvage Value of Existing Equip. \$0
F. Public Utility Company Rebate \$0

G. Total Investment (1D-1E-1F) \$343,000

2. Energy Savings (+) / Costs (-)

Date of NISTIR 85-3273-X used for Discount Factors Oct 1995

======================================	Price	Price Units		Usage Units	Annual Savings	Discount Factor	Discounted Savings
======= Electricity Elec. Deman TOTAL	1 .	===== /Mbtus	_	===== Mbtus Mbtus	-\$900 \$13,900 \$13,000	13.47	-\$12,456 \$187,233 \$174,777

3. Non Energy Savings (+) / Costs (-)

				========
Item	Savings/ Cost	Year	Discount Factor	Discounted Savings/Cost
	=======	======	=======	\$0
ANNUAL TOTAL ONE TIME TOTAL	\$0			\$0 \$0
TOTAL	\$0	ļ	İ	701

4. First Year Dollar Savings

5. Simple Payback Period (Years)

6. Total Net Discounted Savings

7. Savings to Investment Ratio

If < 1, Project does not qualify

8. Adjusted Internal Rate of Return

\$13,000

\$174,777

.51

.65%

26.38

Summary of Recommended ECOs

EC0 #	1 st y Energy Savings, MBTU	15t \$ Savings
1	- 4,429	586,074
5	- 4,776	1,796,136
6	- 2, 453	14.897
7	_ 541	10,116
8	2	30
9	129	1,800
Totals	- 12,068	2,409,053
		K\$ 2,409